Some derivative problems

Differentiate each of the following functions.

1. \( f(x) = x\sqrt{x} \)

2. \( h(x) = \cos(x^2) \)

3. \( f(x) = e^{x^2} \)

4. \( f(x) = e^{3x} \)

5. \( f(x) = e^{ax} \) where \( a \) is a constant

6. \( g(x) = x \cos(x^2) \)

7. \( f(x) = x\sqrt{x^2 + 1} \)

8. \( f(x) = e^{-x} \cos(x) \)

9. \( f(t) = \ln(\sin t) \)

10. \( f(x) = \frac{\ln x}{x^2} \)